REMARKS

Claims 1 to 12 have been examined. Claims 11 and 12 have been deemed to be allowable if rewritten. Claims 1, 4, and 7 to 11 have been amended. Claim 1 has been amended to incorporate features in claim 4. Furthermore, the amendments to claims 1 and 4 are supported, for example, by the description on page 9, line 1 to page 12, line 25. Claims 7 to 10 have been cosmetically amended to correct informalities and eliminate awkward languages. Claim 11 has been rewritten in independent form by incorporating claim 4. No new matter has been added.

Specification

The Abstract has been amended to conform with US practice.

Claim Rejections – 35 USC §102

Claims 1, 2, 4, and 5 have been rejected as being anticipated by Shimizu. However, Applicants submit that those claims are not anticipated by the cited prior art for the following reasons. Claim 1 as amended recites:

> 1. (Amended) A semiconductor device manufacturing method comprising:
> providing a substrate having a first formation area and a second formation area;
> forming an oxide film on the first and the second formation areas;
> forming an oxidation resistance film on the oxide film;
> masking the second formation area by disposing a photoresist on the oxidation resistance film above the second formation area;
> removing the oxidation resistant film above the first formation area;
> removing the photoresist above the second formation area;
> **removing the oxide film above the first formation area while using the oxidation resistant film above the second formation area as a mask;**
> **forming a first oxide film on the first formation area**;
> removing the oxidation resistance film above the second formation area; and
> forming a second oxide film on the second formation area,
> wherein the first oxide film has thickness different from the second oxide film.
> (Emphasis added.)

At least the above bolded features are not disclosed, taught, or suggested by the cited prior art. In Shimizu's Figs. 2C and 2E, the photoresist 401 and the photoresist 501 are used as masks to remove the thin oxide film 201. Shimizu does not show a process in which the oxidation resistant film itself is used as a mask. Thus, at least for this reason, claim 1 is not anticipated by the cited prior art.

Dependent claim 2 is not anticipated at least for the same reason as claim 1.

Claim 4 as amended recites:

> 4. (Amended) A semiconductor device manufacturing method comprising:
> forming a device separation film on the semiconductor;
> forming an oxide film on a first transistor formation area and a second transistor formation area by performing thermal oxidization using the device separation film as a mask;
> forming an oxidation resistant film across the entire surface of the semiconductor;
> removing the oxidation resistant film on the first transistor formation area by using a photoresist film as a mask;
> removing the photoresist film;
> **removing the oxide film on the first transistor formation area by using the oxidation resistant film on the second transistor formation area as a mask;**
> **forming a first oxide film by performing thermal oxidization by using the oxidation resistant film formed on the second transistor formation area as a mask;**
> removing the oxidation resistant film and the oxide film on the second transistor formation area;
> forming a second oxide film on the second transistor formation area by performing thermal oxidization, wherein the first oxide film has thickness different from the second oxide film. (Emphasis added.)

At least the above bolded features are not disclosed, taught, or suggested by the cited prior art. Shimizu does not show using an oxidation resistant film as a mask for removing an oxide film and forming a first oxide film having different thickness than a second oxide film. At least for this reason, claim 4 is not anticipated by the cited prior art.

Dependent claim 5 is not anticipated at least for the same reason as claim 4.

Claim Rejections – 35 USC §103

Claims 3 and 6 have been rejected as being unpatentable over Shimizu in view of Nakata. However, Applicants submit that claims 3 and 5 are patentable over the cited prior art references for the following reasons.

Shimizu does not anticipate claims 1 and 4 as explained above. Nakata also does not show using an oxidation resistant film as a mask for removing or forming an oxide film. For example, Nakata's Fig. 4E shows a nitrified first oxide film 6 being removed with the application of a photoresist 8 (column 4, lines 34 to 36). Nowhere does Nakata show an oxidation resistant film being used as a mask. Thus, claims 1 and 4 are not disclosed, taught or suggested by both Shimizu and Nakata, alone or in combination. Because claims 3 and 6 depend on claim 1 or 4, these claims are not obvious at least for the same reason as claims 1 or 4 are not obvious.

Claims 7 to 10 have been rejected as being unpatentable over Shimizu in view of Ishigaki. Applicants submit that claims7 and 8 are not obvious for the following reasons. Ishigaki also does not teach or suggest the bolded features of claim 4. That is, Ishigaki does not show using an oxidation resistant film as a mask for removing or forming an oxide film. Thus, a person of ordinary skill in the art would not have found obvious the invention of claim 4 by the cited prior art references. Because claims 7 to 10 depend on claim 4 directly or indirectly, these claims are patentable at least for the same reason as claim 4.

Allowable Subject Matter

Claim 11 to 12 have been deemed to be allowable if rewritten in independent form. Claims 11 has been rewritten in independent form to include all the features of claim 4 to render claim 11 allowable. Dependent claim 12 is allowable at least for the same reason as base claim 11.

For the foregoing reasons, all pending claims are believed to be allowable.

Attached is a marked-up version of the changes being made by the current amendment.

Applicant asks that all claims be allowed. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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Chris T. Mizumoto
Reg. No. 42,899

Fish & Richardson P.C.
45 Rockefeller Plaza, Suite 2800
New York, New York 10111
Telephone: (212) 765-5070
Facsimile: (212) 258-2291

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Version with markings to show changes made

In the claims:

Claims 1, 4, and 7 to 11 have been amended as follows:

1. (Amended) A semiconductor device manufacturing method [for forming first and second oxide films having different thicknesses on a semiconductor,] comprising [steps of]:

providing a substrate having a first formation area and a second formation area;

forming an oxide film on the first and the second formation areas;

forming an oxidation resistance film on the oxide film [a second oxide film formation area];

masking the second formation area by disposing a photoresist on the oxidation resistance film above the second formation area;

removing the oxidation resistant film above the first formation area;

removing the photoresist above the second formation area;

removing the oxide film above the first formation area while using the oxidation resistant film above the second formation area as a mask;

forming a first oxide film on [a first oxide film] the first formation area;

removing the oxidation resistance film above the second formation area; and

forming a second oxide film on [a second oxide film] the second formation area, wherein the first oxide film has thickness different from the second oxide film.

2. A semiconductor device manufacturing method according to claim 1,

wherein the first oxide film serves as a gate oxide film of a first transistor, and the second oxide film serves as a gate oxide films of a second transistor.

3. A semiconductor device manufacturing method according to claim 2,

wherein the first transistor is formed on the first oxide film, and the second transistor is formed on the second oxide film,

wherein the first oxide film is formed by performing thermal oxidization by using the oxidation resistant film as a mask,

wherein the second oxide film is formed by performing thermal oxidization.

4. (Amended) A semiconductor device manufacturing method [for forming first and second transistors on semiconductor first and second gate oxide films having different thickness,] comprising [steps of]:

forming a device separation film on the semiconductor;

forming an oxide film on a first transistor formation area and a second transistor formation area by performing thermal oxidization using the device separation film as a mask;

forming an oxidation resistant film across the entire surface of the semiconductor;

removing the oxidation resistant film on the first transistor formation area by using a photoresist film as a mask;

removing the photoresist film;

removing the oxide film on the first transistor formation area by using the oxidation resistant film on the second transistor formation area as a mask;

forming a first oxide film by performing thermal oxidization by using the oxidation resistant film formed on the second transistor formation area as a mask;

removing the oxidation resistant film and the oxide film on the second transistor formation area;

forming a second oxide film on the second transistor formation area by performing thermal oxidization, wherein the first oxide film has thickness different from the second oxide film.

5. A semiconductor device manufacturing method according to claim 4,

wherein a high-voltage MOS transistor is formed on the first gate oxide film thicker than the second gate oxide film,

wherein a normal-voltage MOS transistor is formed on the second gate oxide film.

6. A semiconductor device manufacturing method according to claim 4,

wherein the surface of the semiconductor is not exposed when the photoresist film is used as a mask.

7. (Amended) A semiconductor device manufacturing method according to claim 4, wherein [the step of] forming a first transistor includes [steps of]:

forming [an opposite conductive] a source/drain layer of a first conductive type having a low concentration by implanting [an] ions [implantation] of [an opposite] a first conductive impurity into the semiconductor of [one] a second conductive type;

forming [an opposite conductive] a source/drain layer of the first conductive type having a high concentration in the [opposite conductive] source/drain layer having the low concentration by implanting [the] ions [implantation] of [an opposite] the first conductive impurity into the semiconductor;

forming a semiconductor layer of [one] the second conductive type that serves as a channel and is located between the [opposite conductive] source/drain layers of the first conductive type; and

forming a first gate electrode on the semiconductor [via] through the first gate oxide film.

8. (Amended) A semiconductor device manufacturing method according to claim 7, wherein the [opposite conductive] source/drain layer having [a] the low concentration is formed [so that, at the least, the opposite conductive source/drain layer contacts] to contact at least the semiconductor layer that is formed below the first gate electrode [using an ion implantation method].

9. (Amended) A semiconductor device manufacturing method according to claim 7, wherein the [opposite conductive] source/drain layer having [a] the low concentration [is formed and extended] extends [at a small depth] in [the] a surface layer of the semiconductor, [so that, at the least, the opposite conductive source/drain layer contacts] to contact at least the semiconductor layer that is formed below the first gate electrode [using an ion implantation method].

10. (Amended) A semiconductor device manufacturing method according to claim 4 further comprising [a step of] forming [the] a first transistor after forming the first gate oxide film, including [steps of]:

forming an opposite conductive source/drain layer having a low concentration by implanting [an] ions [implantation] of an opposite conductive impurity into the semiconductor of one conductive type;

forming an opposite conductive source/drain layer having a high concentration in the opposite conductive source/drain layer having the low concentration by implanting [the] ions [implantation] of [an] the opposite conductive impurity into the semiconductor; and

forming a first gate electrode on the semiconductor [via] through the first gate oxide film.

11. (Amended) A semiconductor device manufacturing method [according to claim 4 further] comprising [a step of forming the first transistor after forming the first gate oxide film, including steps of]:

forming a device separation film on the semiconductor;

forming an oxide film on a first transistor formation area and a second transistor formation area by performing thermal oxidization using the device separation film as a mask;

forming an oxidation resistant film across the entire surface of the semiconductor;

removing the oxidation resistant film on the first transistor formation area by using a photoresist film as a mask;

removing the photoresist film;

removing the oxide film on the first transistor formation area by using the oxidation resistant film on the second transistor formation area as a mask;

forming a first oxide film by performing thermal oxidization by using the oxidation resistant film formed on the second transistor formation area as a mask;

removing the oxidation resistant film and the oxide film on the second transistor formation area;

forming a second oxide film on the second transistor formation area by performing thermal oxidization, wherein the first oxide film has thickness different from the second oxide film; and further comprising:

forming a first transistor after forming the first gate oxide film, which includes

forming [an] first impurity layers having a low concentration by [an] implanting ions [implantation] of [an opposite] a first conductive impurity into two portions of the semiconductor of [one] a second conductive type;

forming a second impurity layer having a low concentration by implanting [an] ions [implantation] of [an opposite] the first conductive impurity to connect the first [opposite conductive] impurity layers;

forming a third impurity layer having a high concentration by [an ion implantation] implanting ions of [an] the [opposite] first conductive impurity in the first [opposite conductive] impurity layer;

forming a fourth impurity layer by implanting ions [an ion implantation] of [an one] a second conductive impurity to divide the second impurity layer; and

forming a first gate electrode on the semiconductor including the fourth impurity layer [via] through the first gate oxide film.

12. A semiconductor manufacturing method according to claim 11, wherein the second impurity layer is thinner than the first impurity layer.

In the abstract:

Replace the abstract with the following:

A substrate is provided having first and second formation areas. An oxide film is formed on both formation areas. An oxidation resistance film is then formed on the oxide film. The second formation area is masked by disposing a photoresist on the oxidation resistance film above the second formation area. The oxidation resistant film is removed from the first formation area and then the photoresist above the second formation area is removed. The oxide film above the first formation area is removed while using the oxidation resistant film above the second formation area as a mask. A first oxide film is formed on the first formation area followed by the removal of the oxidation resistance film above the second formation area. Subsequently, a second oxide film is formed on the second formation area. The first oxide film is designed to have thickness different from the second oxide film.